

US EPA ARCHIVE DOCUMENT

**Data Evaluation Report on the terrestrial field dissipation of BAS 510 F**

PMRA Submission Number {.....}

EPA MRID Number 45405221

**Data Requirement:** PMRA DATA CODE:  
EPA DP Barcode: D278387  
OECD Data Point:  
EPA Guideline: 164-1

**Test material:** BAS 510 .. F

**End Use Product name:** Not specified  
**Formulation type:** Wettable granule

**Concentration of a.i.:** 69.6%

**Active ingredient**

Common name:

Chemical name:

IUPAC: 2-Chloro-*N*-(4'-chlorobiphenyl-2-yl)-nicotinamide.

CAS name: 2-Chloro-*N*-(4-chloro[1,1-biphenyl]-2-yl)-3-pyridinecarboxamide.

CAS No: 188425-85-6.

Synonyms: Nicobifen, ~~BAS 516 02 F~~

SMILES string:

**Primary Reviewer:** Dan Hunt  
Dynamac Corporation

**Signature:** Dan Hunt  
**Date:** 1/14/02

**QC Reviewer:** Joan Harlin  
Dynamac Corporation

**Signature:** Joan L Harlin  
**Date:** 1/14/02

**Secondary Reviewer:** Cheryl Sutton  
EPA

**Signature:** Cheryl Sutton  
**Date:** 1/1/02

**Company Code:**

**Active Code:**

**Use Site Category:**

**EPA PC Code:** 128008

**CITATION:** : Jackson, S., M. Saha, and J. McDonell. 2001. 1999 Field dissipation of BAS 510..F in terrestrial use patterns. BASF Study No. 46767. BASF Reg. Doc. No. 2001/5000937. Unpublished study performed by Northern Plains Ag Research, Gardner, ND, Agrisan, Inc., Eaton, CO, and BASF Corporation, Research Triangle Park, NC, and submitted by BASF Corporation, Research Triangle Park, NC. Study initiated March 4, 1999 and completed March 15, 2001.



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**Signature:**

**Date:**

**QC Reviewer:** Joan Harlin

Dynamac Corporation

**Signature:**

**Date:**

**Secondary Reviewer:** Cheryl A. Sutton, Ph.D.

EPA

**Signature:**

**Date:**

*Cheryl Sutton*  
11/21/02

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**Active Code:**

**Use Site Category:**

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## EXECUTIVE SUMMARY:

Soil dissipation/accumulation of BAS 510 F under US field conditions was conducted in bareground plots in North Dakota and Colorado (ecoregions were not reported). The experiment was carried out in accordance with the US EPA Pesticide Assessment Guidelines Subdivision N, 164-1 and in compliance with the US EPA FIFRA (40 CFR, Part 160) GLP standard. At both field sites, BAS 510 F was broadcast twice (5-7 day interval) at a target rate of 0.56 kg a.i./ha in 3.0 x 24.3 m or 5.2 x 29.8 m sampling plots. The applied rate corresponds to 100% of the proposed label rate. Rainfall was supplemented with irrigation to reach the 10- or 30-year average rainfall. The treated plots were 6.1-8.5 m apart, and the control plots were 22.8-57.8 m away from the nearest treated plot at each field site.

The application rate at both sites was verified using fifteen Petri dishes containing soil that were placed in the test plots prior to both applications. The mean recoveries from the field application monitors placed in the test plots were 87% and 92% of the target at the North Dakota site and 84% and 85% of the target at the Colorado site, for the first and second applications, respectively. Field spiking of the samples was done by fortifying control soil from both test sites with BAS 510 F at approximately 0.75 µg/g. The mean recoveries of BAS 510 F from the field spiked samples (across all fortification events) were 85 ± 9.0% and 92 ± 7.8% of the applied for the samples fortified at the North Dakota and Colorado field sites, respectively.

Soil samples were taken prior to and following both applications, at 1, 2, and 3 days following the first application, and at approximately 1, 2, 3, 5, 7, 10, 14, 21, 30, 60, 90, 120, 180, 270, 360, 450, and 540 days following the second application to a depth of 0-120 cm. The soil samples were extracted twice by shaking with methanol followed by methanol:water (50:50, v:v), diluted with water with 0.3% formic acid and 4 mM ammonium formate or water:methanol (50:50, v:v) with 0.3% formic acid and 4 mM ammonium formate and analyzed for BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) by LC-MS/MS. The LOQ for each analyte in soil was 0.010 mg/kg.

At the North Dakota site, the maximum measured concentration following the second application, as a percent of the applied rate, could not be accurately determined. Following the second application, BAS 510 F dissipated from a maximum of 0.859 mg a.i./kg soil at day 0 (0-7.5 cm depth) to 0.249-0.652 mg a.i./kg soil by 1-3 days and 0.111-0.389 mg a.i./kg soil by 6-21 days, and ranged from 0.101 to 0.194 mg a.i./kg soil from 30 to 429 days posttreatment (the last sampling interval). BAS 510 F was only detected in the top (0-15 cm) soil layer. The transformation products 2-chloronicotinic acid (M510F47) and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) were detected at maximum concentrations of 0.022 mg/kg and 0.008 mg/kg (2.2% and 0.8% of the applied amount, respectively), both observed immediately following the second application in the 0-7.5 cm soil layer.

Under field conditions at the North Dakota site, BAS 510 F had a DT50 value of 1 day and a DT75 value of 20 days. At the end of the 429-day period, the total carryover of residues of BAS 510 F was 13.4% of the total applied amount. Data variability at the North Dakota site makes the calculated half-life of questionable value.

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At the Colorado site, the maximum measured concentration following the second application (day 5) was 0.673 mg a.i./kg soil (after adjusting for the concentration present immediately prior to the second application), which is 135% of the applied rate (reviewer-calculated based on the registrant-calculated zero-time core concentration, 0.50 mg/kg). Following the second application, BAS 510 F dissipated from a maximum of 0.779 mg a.i./kg soil at 5 days (0-7.5 cm depth) to 0.478-0.587 mg a.i./kg soil by 21-60 days and 0.289-0.486 mg a.i./kg soil by 91-269 days, and was 0.238 mg a.i./kg soil at 361 days posttreatment (the last sampling interval). BAS 510 F was only detected in the top (0-15 cm) soil layer. The transformation products 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) were detected at maximum concentrations of 0.035 mg/kg and 0.013 mg/kg (3.5% and 1.3% of the applied amount, respectively), observed at 3-5 days following the first application in the 7.5-15 cm soil layer.

Under field conditions at the Colorado site, BAS 510 F had a DT50 value of 119 days and a DT75 value of >361 days. At the end of the 361-day period, the total carryover of residues of BAS 510 F was 24.2% of the total applied amount. However, the DT50 was of questionable value due to data variability. The calculated half-life of 248 days is considered to be more representative of the observed dissipation at that site, and will be used in the fate assessment.

The major routes of dissipation of BAS 510 F under terrestrial field conditions at North Dakota and Colorado could not be determined from the data provided in this report. Leaching was minimal and the major transformation products did not show a pattern of accumulation. Volatilization and runoff were not measured. Based on laboratory studies that demonstrated that the transformation of BAS 510 F resulted primarily from bound residue and CO<sub>2</sub> formation, it is assumed that these were also the predominant dissipation processes in the field. It is noted, however, that the parent compound was observed to be persistent at the North Dakota site, with similar levels (with much higher concentrations observed at two sampling intervals) observed from day 7 through 429 days posttreatment in the surface soil.

### RESULTS SYNOPSIS

Location/soil type: Cass County, North Dakota/Beardon silty clay loam soil series

DT50: 1 day (of questionable value due to extensive data variability)

DT75: 20 days

Major transformation products detected: 2-chloronicotinic acid (M510F47)

Dissipation routes: Could not be determined

Location/soil type: Weld County, Colorado/Kim loam soil series

Half-life: 248 days

DT50: 119 days (of questionable value due to temporal data variability)

DT75: >361 days

Major transformation products detected: 2-chloronicotinic acid (M510F47) and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49)

Dissipation routes: Could not be determined

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**Study Acceptability:** This study is classified acceptable and satisfies the guideline requirement for a terrestrial field dissipation study. It is noted, however, that data variability at both sites makes the reported DT50s of questionable value.

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## I. MATERIALS AND METHODS

**GUIDELINE FOLLOWED:** The study was conducted according to U.S. EPA Pesticide Assessment Guidelines Subdivision N, 164-1. The study did not deviate from EPA Subdivision N 164-1.

**COMPLIANCE:** The study was conducted in compliance with U.S. EPA FIFRA (40 CFR Part 160) Good Laboratory Practice standards. Signed and dated GLP Compliance and No Data Confidentiality statements were provided.

### A. MATERIALS:

1. Test Material BAS 510 F

**Chemical Structure  
of the active ingredient(s):**

**Description:** Wettable granule

**Storage conditions of  
test chemicals:** Storage conditions ranged from -0.6 to 27.9°C from receipt of the test substance until last use (both sites).

Physico-chemical properties of the active ingredient(s): BAS 510 F

Parameter	Values	Comments
Water solubility	4.63 mg/L	Temperature not reported
Vapour pressure/volatility		
UV absorption		
pKa		
K <sub>ow</sub> /log K <sub>ow</sub>		
Stability of Compound at room temperature		

Data obtained from MRID 45405220.

2. Test site: The test sites were located in North Dakota and Colorado (pp. 11-12). The North Dakota test site was located near Gardner, in Cass County, and is representative of the northern region where the largest sales market for wheat products exists, and the Colorado test site was located near Ault, in Weld County, and is representative of the central western crop production region. The North Dakota test plot had previously been treated with Prowl, Pursuit, and 2,4-D in the past three years, and the Colorado test plot had previously been treated with Bronate, Peak,

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Starane, Saber, Eptam, Dual, Champ, Tilt, Asana, and Bladex in the past three years (Appendix B, Tables IX-X, pp. 71 and 81).

**Table 1: Geographic location, site description and climatic data at the study site(s).**

Details		North Dakota	Colorado
Geographic coordinates	Latitude	Not available	Not available
	Longitude	Not available	Not available
	Province/State	Cass County, ND	Weld County, CO
	Country	US	US
	Ecoregion	Not available	Not available
Slope Gradient		<1%	~1%
Depth to ground water (m)		1.2 m	>1.8 m
Distance from weather station used for climatic measurements		Precipitation was collected on-site and other climatic measurements were collected approximately 8 miles from the test site	Precipitation was collected on-site and other climatic measurements were collected approximately 3 miles from the test site
Indicate whether the meteorological conditions before starting or during the study were within 30 year normal levels (Yes/No). If no, provide details.		Precipitation plus irrigation equalled 116% of the historical average.	Precipitation plus irrigation equalled 134% of the historical average.
Other details, if any			

Data obtained from Tables IX-X, pp. 43-44, and Appendix B, pp. 68, 71 and 81, in the study report.

**Table 2: Site usage and management history for the previous three years.**

Use	Year	North Dakota	Colorado
Crops grown	Previous year	Soybeans	Wheat
	2 years previous	Corn	Dry beans
	3 years previous	Soybeans	Corn
Pesticides used	Previous year	Prowl and Pursuit	Bronate, Peak, Starane and Saber
	2 years previous	2,4-D	Eptam, Dual, Champ, Tilt and Asana
	3 years previous	Prowl and Pursuit	Dual and Bladex
Fertilizers used	Previous year	Not available	Not available
	2 years previous	Not available	Not available
	3 years previous	Not available	Not available



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Use	Year	North Dakota	Colorado
Cultivation methods, if provided ( eg., Tillage)	Previous year	Not available	Not available
	2 years previous	Not available	Not available
	3 years previous	Not available	Not available
Other details, if any	Previous year		
	2 years previous		
	3 years previous		

Data obtained from Appendix B, Tables IX-X, pp. 71 and 81, in the study report.

## 3. Soils:

Table 3: Properties of the soil from North Dakota.

Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Textural classification	loam						clay loam	clay
% sand	47	49	47	41	33	29	21	21
% silt	32	30	32	32	40	44	48	30
% clay	21	21	21	27	27	27	31	49
pH (1:1 soil:water or other)	7.9	8.1	8.4	8.7	8.7	8.7	8.5	8.3
Total organic carbon (%)								
Total organic matter (%)	3.2	2.7	1.4	1.0	0.6	0.5	0.5	0.5
CEC (meq/100 g)	22.5	21.6	18.6	17.1	17.1	17.9	19.3	24.9
Bulk density (g/cm3)	1.46-1.62	1.59-1.61	1.58-1.69	1.45-1.69	1.42-1.72	1.51-1.75	1.56-1.72	1.34-1.59
Moisture at 1/3 atm (%)	25.7	25.2	25.3	25.5	27.3	28.4	31.1	39.0
Taxonomic classification (e.g., ferro-humic podzol)	Fine-silty, frigid Aeric Calciaquolls							
Soil mapping unit	Not provided (Beardon soil series)							
Others								

Data obtained from pp. 11- 12, and Table IX, p. 43 in the study report.

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Table 4: Properties of the soil from Colorado.

Property	Depth (cm)							
	0-15	15-30	30-45	45-60	60-75	75-90	90-105	105-120
Textural classification	sandy clay loam			clay loam	sandy clay loam	clay loam		
% sand	60.8	63.4	57.1	42.0	63.7	28.9	26.5	25.2
% silt	14.8	10.7	16.6	22.1	14.9	36.6	42.8	39.3
% clay	24.4	25.9	26.3	35.9	21.4	34.5	30.7	35.5
pH (1:1 soil:water or other)	8.0	8.2	8.2	8.1	8.2	8.3	8.4	8.3
Total organic carbon (%)								
Total organic matter (%)	1.3	1.3	0.9	0.9	1.0	0.8	0.5	0.4
CEC (meq/100 g)	17.0	16.8	17.2	21.5	29.3	32.3	31.0	53.0
Bulk density (g/cm <sup>3</sup> )	1.36-1.54	1.42-1.55	1.47-1.75	1.45-1.63	1.42-1.55	1.34-1.51	1.44-1.55	1.49-1.79
Moisture at 1/3 atm (%)	19.1	18.1	18.1	20.1	26.6	27.6	26.4	28.2
Taxonomic classification (e.g., ferro-humic podzol)	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents							
Soil mapping unit	Not provided (Kim soil series)							
Others								

Data obtained from p. 12, and Table X, p. 44 in the study report.

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## B. EXPERIMENTAL DESIGN:

### 1. Experimental design:

Table 5: Experimental design.

Details		North Dakota	Colorado
Duration of study		436 days (429 days following the last application)	367 days (361 days following the last application)
Uncropped (bare) or cropped		Bare	Bare
Control used (Yes/No)		Yes	Yes
No. of replications	Controls	1	3
	Treatments	3	3
Plot size (L x W m)	Control	1.5 x 24.3 m	5.2 x 10.6 m
	Treatment	3.0 x 24.3 m	5.2 x 29.8 m
Distance between control plot and treated plot		57.8 m from the nearest treated plot	22.8 m from the nearest treated plot
Distance between treated plots		6.1-6.7 m	8.5 m
Application rate(s) used (g a.i/ha)		560 g a.i/ha	560 g a.i/ha
Was the maximum label rate per ha used in study? (Yes/No)		Yes	Yes
Number of applications		2	2
Application Date(s) (dd mm yyyy)		24/5/1999 and 31/5/1999	27/7/1999 and 2/8/1999
For multiple applications, application rate at Day 0 and at each application time (mg a.i./kg soil) (assuming 7.5 cm depth and bulk density of 1.5 g/cm <sup>3</sup> )		0.50 mg/kg for both applications	0.50 mg/kg for both applications
Application method (eg., spraying, broadcast etc.)		Broadcast	Broadcast
Type of spray equipment, if used		Tractor-mounted flat boom sprayer with flat fan 8002 nozzles	Tractor-mounted flat boom sprayer with flat fan 11003XR nozzles
Total volume of spray solution applied/plot OR total amount broadcasted/plot		40 gal/A	40 gal/A
Identification and volume of carrier (e.g., water), if used		Water	Water
Name and concentration of co-solvents, adjuvants and/or surfactants, if used		None	None

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Details		North Dakota	Colorado
Indicate whether the following monthly reports were submitted:			
Average minimum and maximum precipitation		Yes	Yes
Average minimum and maximum air temperature		Yes	Yes
Average minimum and maximum soil temperature		No	No
Average annual frost-free periods		No	No
Indicate whether the Pan evaporation data were submitted		No	No
Meteorological conditions during application	Cloud cover	85% and 97% for applications 1 and 2, respectively	10% and 100% for applications 1 and 2, respectively
	Temperature (°C)	13.9 for both applications	28.3 and 13.9 for applications 1 and 2, respectively
	Humidity	76% and 72% for applications 1 and 2, respectively	13% and 45% for applications 1 and 2, respectively
	Sunlight (hr)	Not available	Not available
Pesticides used during study: name of product/a.i concentration: amount applied: application method:		The test plot was treated 3 times with Roundup (0.75 lb a.i./A) and once each with Achieve (0.18 lb a.i./A) and MCPA ester (0.5 lb a.i./A).	The test plot was treated twice with Roundup at 1.24 lb a.i./A and was not treated with any other pesticides during the study period.
Supplemental irrigation used (Yes/No) If yes, provide the following details: No. of irrigation: Interval between irrigation: Amount of water added each time: Method of irrigation:		Yes, via sprinkler. The test plot received a total of 2.2 inches from irrigation, all during the month of July 1999.	Yes, via sprinkler. The test plot received a total of 9.7 inches from irrigation. The test plot was irrigated throughout the study, and received a maximum of 2.6 inches during the month of August 1999.
Indicate whether water received through rainfall + irrigation equals the 30 year average rainfall (Yes/No)		Yes	Yes
Were the application concentrations verified? (Briefly describe in Section 2*, if used)		Yes	Yes
Were field spikes used? (Briefly describe in Section 3†, if used)		Yes	Yes
Good agricultural practices followed (Yes or No)		Yes	Yes

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Details	North Dakota	Colorado
Indicate if any abnormal climatic events occurred during the study (eg., drought, heavy rainfall, flooding, storm etc.)	No	No
If cropped plots are used, provide the following details:  Plant - Common name/variety: Details of planting: Crop maintenance (eg., fertilizers used):	N/A	N/A
Volatilization included in the study (Yes/No) (if included, describe in Section 4 <sup>§</sup> )	No	No
Leaching included in the study (Yes/No) (if included, describe in Section 5 <sup>†</sup> )	Yes	Yes
Runoff included in the study (Yes/No) (if included, describe in Section 6 <sup>*</sup> )	No	No

Data obtained from Tables IX-X, pp. 43-44, Appendix B, pp. 58-89, in the study report.

**\* 2. Application Verification:** The application rate at both sites was verified using fifteen Petri dishes (100 mm) that were placed in the test plots prior to both applications (p. 13). Each Petri dish contained approximately 10 g of sieved soil from an untreated portion of the test site. The Petri dishes were collected and composited (three dishes per composite) immediately following each application.

**† 3. Field Spiking:** Samples (20 g) of sieved (1 mm) control soil collected from each test site were fortified with 15 µg BAS 510 F solution on the sampling intervals targeting 0, 3, 7, 14, 30, 60, and 360 days following the second application (p. 13; Appendix B, p. 67). The field fortified samples were analyzed at about the same time as the corresponding soil core samples (p. 25). Field spiked samples were not prepared for the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide.

**§ 4. Volatilization:** Volatilization was not measured.

**† 5. Leaching:** Fifteen cores were taken from the treated plots prior to and following both applications, at 1, 2, and 3 days following the first application, and at approximately 1, 2, 3, 5, 7, 10, 14, 21, 30, 60, 90, 120, 180, 270, 360, 450, and 540 days following the second application to a depth of 120 cm to determine the mobility of the test substance in the soil profile (p. 12). In field Time Domain Reflectometry (TDR) units were used to determine if sufficient water was applied to the test plots and to determine if compound movement correlated to recharge events (p. 21).

**\* 6. Runoff:** Runoff was not studied.

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**7. Supplementary Study:** Two method validation studies (MRIDs 45405225 and 45405226) and two storage stability studies (MRIDs 45405223 and 45405224) were conducted and submitted.

**MRID 45405225.** BASF Method D0004 "The determination of residues of BAS 510 F and its metabolites 2-chloronicotinic acid and 1-(4-chlorophenyl)-2-aminobenzene in soil using LC-MS/MS" was validated using control soil from California, Indiana, New Jersey, and Alberta, and German 2.2 soil (Appendix E, pp. 85-86). Soil samples were fortified at 0.01, 0.1, and 1.0 ppm. The method was later modified (without change to the protocol) to include the degradate 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide and to remove 1-(4-chlorophenyl)-2-aminobenzene (BASF Method D0004/1), and was validated using control soil collected from Georgia, California, and Alberta, and German 2.2 soil.

**MRID 45405226.** BASF Method D0004/1 "The determination of residues of BAS 510 F and its metabolites 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide in soil using LC-MS/MS" was validated in an independent laboratory using a high clay content soil from Illinois (p. 8). Samples were fortified at 0.01 and 0.10 mg/kg.

**MRID 45405224.** A loamy sand soil from Germany was treated with diphenyl ring-labeled <sup>14</sup>C-BAS 510 F at a concentration of 0.930 mg/kg and stored frozen (-18 to -22°C) for up to 2 years prior to analysis (pp. 11-13). Samples were collected for analysis at 0, 30, 87, 181, 365, and 730 days posttreatment.

**MRID 45405223.** Soil samples (0-6 and 12-18 inch depths) were treated with BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide at a concentration of 0.1 ppm (p. 9). Samples fortified with BAS 510 F and 2-chloronicotinic acid were collected for analysis at day 0 and 1, 3, and 6 months posttreatment; samples collected at day 0 and 1 month were extracted and analyzed according to BASF Method D0004 and samples collected at 3 and 6 months were extracted and analyzed according to BASF Method D0004/1. Samples fortified with 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were collected for analysis at day 0 and 1 and 3 months posttreatment; all samples were extracted and analyzed according to BASF Method D0004/1.

### 8. Sampling:

Table 6: Soil sampling.

Details	North Dakota	Colorado
Method of sampling (random or systematic)	Random	Random
Sampling intervals	At 0, 1, 2, 3, and 5 days following the first application and at 0, 1, 2, 3, 6, 7, 10, 14, 21, 30, 60, 90, 120, 174, 327, 359, and 429 days following the second application	At 0, 1, 2, 3, and 5 days following the first application and at 0, 1, 2, 4, 5, 7, 10, 14, 21, 31, 60, 91, 120, 217, 269, and 361 days following the second application
Method of soil collection (eg., cores)	Cores	Cores

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Details	North Dakota	Colorado
Sampling depth	120 cm	120 cm
Number of cores collected per plot	15 (5 per replicate)	15 (5 per replicate)
Number of segments per core	Nine	Nine
Length of soil segments	7.5 cm (0-15 cm depth) and 15 cm (15-120 cm depth)	7.5 cm (0-15 cm depth) and 15 cm (15-120 cm depth)
Core diameter (Provide details if more than one width)	4 inch diameter (0-15 cm depth samples) and 1.5-1.75 inch diameter (15-120 cm depth samples)	4 inch diameter (0-15 cm depth samples) and 1.5-1.75 inch diameter (15-120 cm depth samples)
Method of sample processing, if any	Composited by depth and replicate, and homogenized prior to analysis	Composited by depth and replicate, and homogenized prior to analysis
Storage conditions	Frozen	Frozen
Storage length (days)	611 days	611 days

Data obtained from pp. 12, 16, and 18, and Appendix B, pp. 64-65, in the study report.

**9. Analytical Procedures:** Soil samples were analyzed for BAS 510 F and the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49) using BASF Draft Analytical Method D0004/1 with modifications (p. 16; Appendix C, pp. 116-117). Soil samples were extracted by shaking with methanol followed by methanol:water (50:50, v:v). After the extraction step was repeated, the samples were centrifuged and the extracts were diluted with methanol. For low residue samples, an aliquot of the extract was further diluted with HPLC grade water with 0.3% formic acid and 4 mM ammonium formate and filtered prior to LC-MS/MS analysis. For higher residue samples, an aliquot of the extract was further diluted with water:methanol (50:50, v:v) with 0.3% formic acid and 4 mM ammonium formate and filtered prior to LC-MS/MS analysis. The limit of quantitation for each analyte was 0.010 mg/kg (p. 16). Mean recoveries of BAS 510 F, 2-chloronicotinic acid, and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide from concurrent fortification samples (prepared at both test sites) were 94% for BAS 510 F, 94% for 2-chloronicotinic acid and 103% for 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide, and indicated that the method was adequate (pp. 16-17).

## II. RESULTS AND DISCUSSION

**1. APPLICATION MONITORS:** The mean recoveries from the field application monitors at the North Dakota test site were 87% and 92% of the target for the first and second applications, respectively, and the mean recoveries from the field application monitors at the Colorado test site were 85% and 84% of the target for the first and second applications, respectively (Table I, p. 25).

**2. RECOVERY FROM FIELD SPIKES:** The mean recoveries of BAS 510 F from the field spiked samples (across all fortification events) were  $85 \pm 9.0\%$  and  $92 \pm 7.8\%$  of the applied for

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the samples fortified at the North Dakota and Colorado field sites, respectively (Appendix E, p. 243). Field spiked samples were not prepared for the degradates 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide.

**3. MASS ACCOUNTING:** A mass balance was not determined.



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Table 7. Concentration of BAS 510 F residues expressed as mg/kg soil, in the North Dakota plot.

Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
		App1	1	2	3	App2	1	2	3	6	7	14	21	30	60
Parent compound (BAS 510 F)	0-7.5	0.454	0.224	0.196	0.582	0.859	0.526	0.249	0.652	0.378	0.111	0.135	0.389	0.194	0.135
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-chloronicotinic acid)	0-7.5	0.013	0.009	0.013	0.017	0.022	0.011	<0.01	0.021	0.009	<0.01	<0.01	0.017	0.010	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	0.008	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-hydroxy-N-(4-chlorobiphenyl-2-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	0.005	0.008	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total non-extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
		App1	1	2	3	App2	1	2	3	6	7	14	21	30	60
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
Parent compound (BAS 510 F)	0-7.5	90	120	174	327	359	429								
	7.5-15	0.127	0.110	0.110	0.101	0.177	0.122								
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	0.012								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Transformation product (2-chloronicotinic acid)	0-7.5	0.008	<0.01	<0.01	<0.01	<0.01	<0.01								
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Transformation product (2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND								
	7.5-15	ND	ND	ND	ND	ND	ND								
	15-30	ND	ND	ND	ND	ND	ND								

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Compound	Soil depth (cm)	Sampling times (application number or days following previous application)							
		90	120	174	327	359	429		
Total non-extractable residues (if determined)	30-45	ND	ND	ND	ND	ND	ND		
	0-7.5	ND	ND	ND	ND	ND	ND		
	7.5-15	ND	ND	ND	ND	ND	ND		
	15-30	ND	ND	ND	ND	ND	ND		
	30-45	ND	ND	ND	ND	ND	ND		
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND		
	7.5-15	ND	ND	ND	ND	ND	ND		
	15-30	ND	ND	ND	ND	ND	ND		
	30-45	ND	ND	ND	ND	ND	ND		

Data obtained from Tables XI-XIII, pp. 45-47.

Reported values are registrant-calculated averages of three replicates. In instances where there was a non-detect in one or more of the replicates, the registrant used the value zero in place of each non-detect in their calculation to determine the mean, thus resulting in some mean values that are below the LOD (0.01 mg/kg).  
 ND = Not determined

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Table 8. Concentration of BAS 510 F residues expressed as mg/kg soil, in the Colorado plot.

Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
		App1	1	2	3	5	App2	1	2	4	5	7	14	21	31
Parent compound (BAS 510 F)	0-7.5	0.377	0.471	0.345	0.378	0.106	0.653	0.701	0.704	0.575	0.779	0.598	0.708	0.587	0.478
	7.5-15	<0.01	<0.01	<0.01	0.161	0.244	0.051	<0.01	<0.01	<0.01	<0.01	0.037	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-chloronicotinic acid)	0-7.5	0.010	<0.01	0.013	0.012	0.003	0.020	0.016	0.020	0.017	0.023	0.017	0.016	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	0.035	0.026	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Transformation product (2-hydroxy-N-(4-chlorobiphenyl-2-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	0.005	<0.01	0.008	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	7.5-15	<0.01	<0.01	<0.01	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	15-30	<0.01	<0.01	<0.01	0.009	<0.01	0.013	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total non-extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
		App1	1	2	3	5	App2	1	2	4	5	7	14	21	31
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	7.5-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	15-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	30-45	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Compound	Soil depth (cm)	Sampling times (application number or days following previous application)													
Parent compound (BAS 510 F)	0-7.5	60	91	120	217	269	361								
	7.5-15	0.529	0.289	0.486	0.350	0.354	0.238								
	15-30	<0.01	0.019	<0.01	0.006	0.012	0.004								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Transformation product (2-chloronicotinic acid)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	15-30	<0.01	<0.01	<0.01	<0.01	0.003	<0.01								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Transformation product (2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide)	0-7.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	7.5-15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	15-30	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
	30-45	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Total extractable residues (if determined)	0-7.5	ND	ND	ND	ND	ND	ND								
	7.5-15	ND	ND	ND	ND	ND	ND								
	15-30	ND	ND	ND	ND	ND	ND								

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Compound	Soil depth (cm)	Sampling times (application number or days following previous application)							
		60	91	120	217	269	361		
Total non-extractable residues (if determined)	30-45	ND	ND	ND	ND	ND	ND		
	0-7.5	ND	ND	ND	ND	ND	ND		
	7.5-15	ND	ND	ND	ND	ND	ND		
	15-30	ND	ND	ND	ND	ND	ND		
	30-45	ND	ND	ND	ND	ND	ND		
Total recovery	0-7.5	ND	ND	ND	ND	ND	ND		
	7.5-15	ND	ND	ND	ND	ND	ND		
	15-30	ND	ND	ND	ND	ND	ND		
	30-45	ND	ND	ND	ND	ND	ND		

Data obtained from Tables XIV-XVI, pp. 48-50.

Reported values are registrant-calculated averages of three replicates. In instances where there was a non-detect in one or more of the replicates, the registrant used the value zero in place of each non-detect in their calculation to determine the mean, thus resulting in some mean values that are below the LOD (0.01 mg/kg).

ND = Not determined

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**4. PARENT COMPOUND:** At the North Dakota site, the maximum measured concentration following the second application, as a percent of the applied rate, could not be accurately determined because samples were not analyzed immediately prior to the second application to adjust for residues already present in the soil (samples were last analyzed 4 days prior to the second application). BAS 510 F was detected in the 0-7.5 cm depth at 0.454 mg a.i./kg soil following the first application, decreased to 0.196-0.224 mg a.i./kg soil from 1 to 2 days, and was 0.582 mg a.i./kg soil at 3 days posttreatment of the first application (Table XI, p. 45). Following the second application, BAS 510 F was detected in the 0-7.5 cm depth at 0.859 mg a.i./kg soil at day 0, was variable from 0.249 to 0.652 mg a.i./kg soil from 1 to 3 days and 0.111 to 0.389 mg a.i./kg soil from 6 to 21 days, and ranged from 0.101 to 0.194 mg a.i./kg soil from 30 to 429 days posttreatment (the last sampling interval). BAS 510 F was only detected in the 7.5-15 cm depth once, at 0.012 mg a.i./kg soil at 429 days posttreatment of the second application, and was not detected below that depth.

At the Colorado site, the maximum measured concentration following the second application (day 5) was 0.673 mg a.i./kg soil (after adjusting for the concentration present immediately prior to the second application), which is 135% of the applied rate (reviewer-calculated based on the registrant-calculated zero-time core concentration, 0.50 mg/kg, reported in Table II, p. 25). BAS 510 F was detected in the 0-7.5 cm depth at a maximum of 0.471 mg a.i./kg soil at 1 day following the first application, decreased to 0.345-0.378 mg a.i./kg soil from 2 to 3 days, and was 0.106 mg a.i./kg soil at 5 days posttreatment of the first application (just prior to the second application; Table XIV, p. 48). Following the second application, BAS 510 F was detected in the 0-7.5 cm depth at 0.575-0.704 mg a.i./kg soil from 0 to 4 days, was a maximum of 0.779 mg a.i./kg soil at 5 days, decreased to 0.478-0.587 mg a.i./kg soil from 21 to 60 days and 0.289-0.486 mg a.i./kg soil from 91 to 269 days, and was 0.238 mg a.i./kg soil at 361 days posttreatment (the last sampling interval). BAS 510 F was detected in the 7.5-15 cm depth at a maximum of 0.161-0.244 mg a.i./kg soil at 3-5 days following the first application and was detected sporadically following the second application at not more than 0.051 mg a.i./kg soil. BAS 510 F was not detected below the 7.5-15 cm depth at any sampling interval.

The 50% dissipation times (DT50) of BAS 510 F in soil under terrestrial field conditions using non-linear regression (using the Gustafson/Holden equation) were (pp. 18-21, Table III, p. 26, Figures 4-5, p. 27):

North Dakota	DT50 = 1 day	DT75 = 20 days
Colorado	DT50 = 119 days (half-life = 248 days)	DT75 = >361 days

The dissipation pattern was non-linear at both test sites. The DT50s are both of questionable value due to data variability.

**5. TRANSFORMATION PRODUCTS:** The transformation products detected in the North Dakota test plot were 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49), with maximum concentrations of 0.022 mg/kg and 0.008 mg/kg (2.2% and 0.8% of the applied amount, respectively), both observed immediately following the second application in the 0-7.5 cm soil layer (Tables XII-XIII, pp. 46-47). 2-chloronicotinic acid

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and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were not detected at the end of the study period.

The transformation products detected in the Colorado test plot were 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide (M510F49), with maximum concentrations of 0.035 mg/kg and 0.013 mg/kg (3.5% and 1.3% of the applied amount, respectively), observed at 3-5 days following the first application in the 7.5-15 cm soil layer (Tables XV-XVI, pp. 49-50). 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were not detected at the end of the study period.

Table 9: Chemical names and CAS numbers for the transformation products of BAS 510 F.

Applicant's Code Name	CAS Number	CAS and/or IUPAC Chemical Name(s)	Chemical formula	Molecular weight	SMILES string
CNA		2-chloronicotinic acid	C <sub>6</sub> H <sub>4</sub> ClNO <sub>2</sub>	157.56	
M510F49		2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide	C <sub>18</sub> H <sub>13</sub> ClN <sub>2</sub> O <sub>2</sub>	324.77	

### 6. EXTRACTABLE AND NON-EXTRACTABLE RESIDUES: Non-extractable residues were not measured.

Table 10: Dissipation routes of BAS 510 F under field conditions.

Route of dissipation	% of applied amount (at the end of study period)	
	North Dakota test site	Colorado test site
Accumulation (residues ) in soil/ carry over <sup>1</sup>	13.4%	24.2%
Transformation (% of transformation products)	0%	0%
Leaching, if measured	Did not leach beyond 15 cm.	Did not leach beyond 15 cm.
Volatilization, if measured	Not measured	Not measured
Plant uptake, if measured	N/A	N/A
Runoff, if measured	Not measured	Not measured
Total		

<sup>1</sup> Accumulation in soil was calculated by the reviewer by dividing the total parent BAS 510 F residues at the end of the study period by the total application rate (1.0 lb a.i./A).

### 7. VOLATILIZATION: The concentration of applied BAS 510 F lost through volatilization was not determined.

### 8. PLANT UPTAKE: N/A



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**9. LEACHING:** BAS 510 F did not leach below 15 cm in the North Dakota and Colorado test plots (Tables XI and XIV, pp. 45 and 48). Maximum concentrations of BAS 510 F were 0.779-0.859 mg a.i./kg soil in the 0-7.5 cm depth and 0.012-0.244 mg a.i./kg soil in the 7.5-15 cm depth. The transformation products 2-chloronicotinic acid and 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide generally did not leach beyond the 0-15 cm layer; however, both compounds were detected sporadically, at very low concentrations, in the 15-30 cm layer and 2-chloronicotinic acid was detected twice in the 30-45 cm layer (Tables XII, XIII, XV, and XVI, pp. 46, 47, 49, and 50). TDR water flux measurements indicated that appreciable recharge occurred in both test plots at the four foot depth (Figures 8-9, pp. 32-33).

**10. Runoff:** Runoff was not studied.

**11. RESIDUE CARRYOVER:** DT75 values were 20 days and >361 days for the North Dakota and Colorado test plots, respectively (Table III, p. 26). After 361-429 days, 13.4% and 24.2% of the total applied parent compound (1.0 mg/kg, based on the registrant-calculated concentration for a single application, reported as 0.50 mg/kg; Table II, p. 25) was detected in the North Dakota and Colorado test plots, and has the potential to carryover into the following season. No transformation products were detected at the end of the study period at either test site.

**12. SUPPLEMENTARY STUDY RESULTS:** Based on data reported in the method validation study **MRID 45405225**, using BASF Method D0004, mean recoveries of BAS 510 F were 96%, 97%, and 94% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, and mean recoveries of 2-chloronicotinic acid were 92%, 88%, and 87% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively (Appendix E, Table VIII, p. 106). Using BASF Method D0004/1, mean recoveries of BAS 510 F were 96%, 95%, and 94% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, mean recoveries of 2-chloronicotinic acid were 93%, 96%, and 88% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively, and mean recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were 88%, 91%, and 92% for the 0.01, 0.1, and 1.0 ppm fortifications, respectively (Table III, p. 28). Results were not reported for 1-(4-chlorophenyl)-2-aminobenzene because they do not pertain to the study under review. Based on data reported in the independent method validation study **MRID 45405226**, using BASF Method D0004/1, mean recoveries of BAS 510 F were 82% and 95% for the 0.01 and 0.10 mg/kg fortifications, respectively, mean recoveries of 2-chloronicotinic acid were 91% and 94% for the 0.01 and 0.10 mg/kg fortifications, respectively, and mean recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide were 84% and 91% for the 0.01 and 0.10 mg/kg fortifications, respectively (Table I, p. 16).

Based on data reported in the storage stability study **MRID 45405224**, diphenyl ring-labeled <sup>14</sup>C-BAS 510 F was stable in soil treated at a concentration of 0.930 mg/kg and stored frozen for up to 2 years. Mean recoveries (from duplicate replicates) ranged from 98.5% to 106.9% throughout the storage period (Table 2, p. 19). Based on data reported in the storage stability study **MRID 45405223**, BAS 510 F and 2-chloronicotinic acid were stable in soil treated at 0.1 ppm and stored frozen for up to 6 months. Recoveries of both compounds ranged from 88% to 105% throughout the storage period (Tables I.A-I.B, pp. 23-24). Recoveries of 2-hydroxy-N-(4'-chlorobiphenyl-2-yl)nicotinamide decreased from 99-111% at day 0 to 70-76% by 1 month and 75-84% by 3 months posttreatment (Tables II.A-II.B, p. 25).

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**III. STUDY DEFICIENCIES:** No deficiencies were noted other than the observed data variability.

### IV. REVIEWER'S COMMENTS:

1. The major routes of dissipation of BAS 510 F under terrestrial field conditions at the two test sites could not be determined from the data provided in this report. Leaching was minimal and the major transformation products did not show a pattern of accumulation. Volatilization and runoff were not measured. Based on laboratory studies that demonstrated that the transformation of BAS 510 F resulted primarily from bound residue and CO<sub>2</sub> formation, it is assumed that these were also the predominant dissipation processes in the field. It is noted, however, that the parent compound was observed to be persistent at the North Dakota site, with similar levels (with much higher concentrations observed at two sampling intervals) observed from day 7 through 429 days posttreatment in the surface soil.
2. The registrant-calculated DT50 of BAS 510 F at the North Dakota test plot was 1 day, and was comparable to the observed half-life (a calculated half-life was not determined). The registrant-calculated DT50 of BAS 510 F at the Colorado test plot was 119 days, and was significantly more rapid than the calculated half-life value of 248 days ( $r^2 = 0.55$ ) which was calculated using linear regression (all available data). The reviewer notes that data from both test plots were variable between replicates and over time, making the DT50s of questionable value. The reviewer also notes that the DT50's were calculated based on the total residue concentration per sampling period (all soil depths) while the calculated half-lives were calculated based on only the top 0-7.5 cm soil depth. The calculated half-life of 248 days is considered to be more representative of the observed dissipation at the Colorado site, and will be used in the fate assessment.
3. The study authors stated that the degradation of BAS 510 F is primarily a function of soil microbial activity, and accurately predicted the half-life at the Colorado site (within a variance of 14 days) using a model based on the accumulation of soil heat units (p. 22); the predicted half-life value at the North Dakota site was 66 days. Results were reported in Table IV (p. 29) and shown graphically in Figure 7 (p. 29). As noted previously, however, the parent compound was observed to be persistent at the North Dakota site.
4. The reviewer notes that data were not reported for samples collected at 5 days following the first application (North Dakota test plot) and at 10 days following the second application (North Dakota and Colorado test plots; Appendix B, Table V, p. 65). No explanation was provided by the study authors.
5. Evapotranspiration data were reported for each test location in place of pan evaporation data.
6. BAS 510 F chemical name 2-chloro-*N*-(4'-chlorobiphenyl-2-yl)-nicotinamide, as presented in the study report, was identified as the IUPAC name by the Compendium of

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Pesticide Common Names (<http://www.hclrss.demon.co.uk/nicobifen.html>). The CAS name 2-chloro-*N*-(4-chloro[1,1-biphenyl]-2-yl)-3-pyridinecarboxamide was also obtained from the Compendium of Pesticide Common Names. The following BAS 510 F synonyms were obtained from USEPA/OPP Chemical Databases (<http://www.cdpr.ca.gov/cgi-bin/epa/chemidetriris.pl?pccode=128008> and ([http://www.cdpr.ca.gov/cgi-bin/mon/bycode.pl?p\\_chemcode=5790](http://www.cdpr.ca.gov/cgi-bin/mon/bycode.pl?p_chemcode=5790)): 2-chloro-*N*-(4'-chlorobiphenyl-2-yl)-nicotinamide, nicobifen, and BAS 516 02 F.

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NRUD NO. 4540521

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- Identity of the source of product ingredients.
- Sales or other commercial/financial information.
- A draft product label.
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- X   FIFRA registration data.
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Chemical Name

BAS 510 F

North Dakota

PC Code

128008

MRID

45405221

Half-life (days) = Not calculated

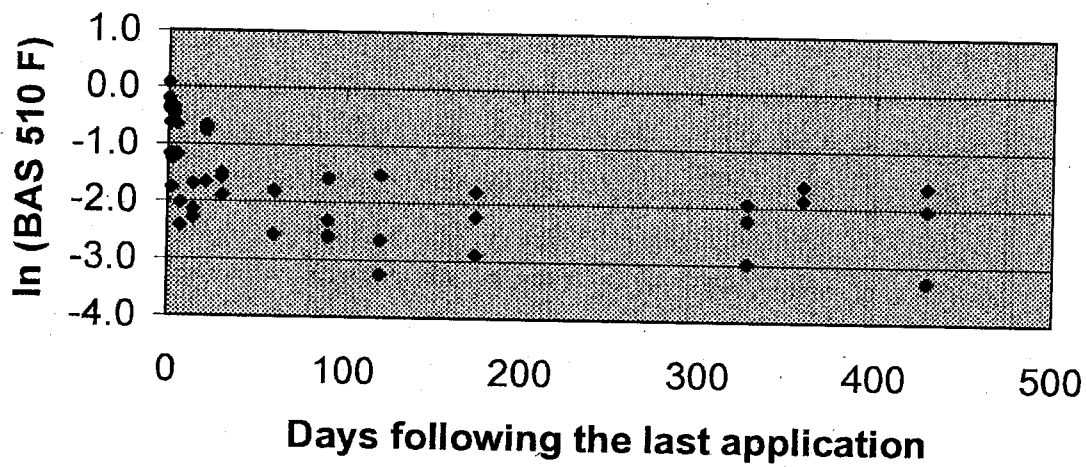
Guideline No.

164-1

Days posttreatment of the last application	BAS 510 F (mg/kg)	Ln (BAS 510 F)
0	0.814	-0.206
0	0.688	-0.374
0	1.075	0.072
1	0.310	-1.171
1	0.533	-0.629
1	0.734	-0.309
2	0.171	-1.766
2	0.283	-1.262
2	0.292	-1.231
3	0.647	-0.435
3	0.612	-0.491
3	0.698	-0.360
5	0.302	-1.197
5	0.521	-0.652
5	0.310	-1.171
7	0.131	-2.033
7	0.090	-2.408
14	0.103	-2.273
14	0.117	-2.146
14	0.186	-1.682
21	0.510	-0.673
21	0.190	-1.661
21	0.466	-0.764
30	0.152	-1.884
30	0.223	-1.501
30	0.206	-1.580
60	0.077	-2.564
60	0.166	-1.796
60	0.163	-1.814
90	0.099	-2.313
90	0.075	-2.590
90	0.207	-1.575
120	0.219	-1.519
120	0.039	-3.244
120	0.071	-2.645
174	0.108	-2.226
174	0.056	-2.882
174	0.166	-1.796
327	0.109	-2.216
327	0.143	-1.945
327	0.051	-2.976
359	0.198	-1.619
359	0.156	-1.858
429	0.196	-1.630
429	0.133	-2.017
429	0.038	-3.270

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# Dissipation of BAS 510 F from the North Dakota bare-ground plot



Chemical Name  
PC Code  
MRID  
Guideline No.

BAS 510 F  
128008  
45405221  
164-1

Colorado

Half-life (days) = 247.6

Days posttreatment of the last application	BAS 510 F (mg/kg)	Ln (BAS 510 F)
0	0.547	-0.603
0	0.649	-0.432
0	0.763	-0.270
1	0.453	-0.792
1	0.898	-0.108
1	0.752	-0.285
2	0.667	-0.405
2	0.710	-0.342
2	0.736	-0.307
4	0.415	-0.879
4	0.606	-0.501
4	0.705	-0.350
5	0.738	-0.304
5	0.832	-0.184
5	0.768	-0.264
7	0.537	-0.622
7	0.496	-0.701
7	0.762	-0.272
14	0.600	-0.511
14	0.633	-0.457
14	0.891	-0.115
21	0.514	-0.666
21	0.575	-0.553
21	0.673	-0.396
31	0.380	-0.968
31	0.458	-0.781
31	0.595	-0.519
60	0.528	-0.639
60	0.614	-0.488
60	0.446	-0.807
91	0.392	-0.936
91	0.175	-1.743
91	0.301	-1.201
120	0.419	-0.870
120	0.690	-0.371
120	0.348	-1.056
217	0.371	-0.992
217	0.368	-1.000
217	0.312	-1.165
269	0.276	-1.287
269	0.362	-1.016
269	0.425	-0.856
361	0.306	-1.184
361	0.122	-2.104
361	0.286	-1.252



# Dissipation of BAS 510 F from the Colorado bare-ground plot

